PD-03W124

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	)	
Mary Morabito O'Neill et al.	)	GAU: 2878
Ser. No. 10/790,889	)	Examiner:
Filed: March 1, 2004	)	Kevin Wyatt
For: IMAGING SENSOR SYSTEM WITH STAGGERED	)	
ARRANGEMENT OF IMAGING DETECTOR	)	
SUBELEMENTS, AND METHOD FOR LOCATING	)	
A POSITION OF A FEATURE IN A SCENE	)	

APPEAL BRIEF

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Applicant files its Appeal Brief, together with a Fee Transmittal authorizing the charging of the required fee. A Notice of Appeal and fee were previously filed.

Table of Contents

Real party in interest

The real party in interest is the assignee, Raytheon Company.

Related appeals and interferences

Applicant is not aware of any related appeals and/or interferences.

Status of claims

Claims 1-20 were filed.

During prosecution, claims 13 and 16 were amended, and new claim 21 was added.

In the Office Action of March 21, 2008 ("Office Action" hereinafter), claims 1-5, 11-15, and 17-21 were rejected.

Claims 6-10 and 16 are not rejected by any properly stated rejection, and are presumed allowed. Applicant requested on several occasions that the Examiner set forth proper statements of rejections for these claims 6-10 and 16. The Examiner refused, arguing that it was sufficient to mention the claims in the explanations of the rejections of other claims (see Advisory Action). The Examiner's position is not correct, see "MPEP 707.07(d), Language To Be Used in Rejecting Claims: Where a claim is refused for any reason relating to the merits thereof it should be 'rejected' and the ground of rejection fully and clearly stated, and the word 'reject' must be used. The examiner should designate the statutory basis for any ground of rejection by express reference to a section of 35 U.S.C. in the opening sentence of each ground of rejection."

Applicant cannot force the Examiner to state a proper ground of rejection of claims. Applicant can only appeal the actual rejections. Claims 6-10 and 16, which have not been properly rejected, are set forth in Appendix IV.

The rejection of claims 1-5, 11-15, and 17-21 is appealed. These claims are set forth in Appendix I.

Status of amendments

A Response to Final Office Action was filed, but it included no amendments to the claims.

Summary of claimed subject matter

There are three independent claims 1, 13, and 17. There are no means claims and no step plus function claims.

Claim 1

The imaging sensor system of claim 1 is illustrated in Figures 1-3, and discussed in detail at page 6, line 10-page 14, line 19. The concept of blur-circle image is illustrated in Figure 5.

Claim 1 recites an imaging sensor system (20) comprising an optics system (22) that images a point feature of a scene at an image plane (24) as a blur-circle image (84) having a blur diameter, and a detector array (28) at the image plane (24). The detector array (28) is a one-dimensional detector array (28) comprising a plurality of detector subelements (42) each having a width of from about 1/2 to about 5 blur diameters, and a length of n blur diameters. Each detector subelement (42) overlaps each of two adjacent detector subelements (42) along their lengths. An overlap of each of the two adjacent detector subelements (42) is m blur diameters and a center-to-center spacing of each of the two adjacent detector subelements (42) is n_O blur diameters. The value of n is equal to about 3m, and m is equal to about $n_O/2$.

Claim 13

The imaging sensor system of claim 13 is illustrated in Figures 1-3, and discussed in detail at page 6, line 10-page 14, line 19. The concept of blur-circle image (84) is illustrated in Figure 5.

Claim 13 recites an imaging sensor system (20) comprising an optics system (22) that images a point feature of a scene at an image plane (24) as a blur-circle image (84) having a blur diameter, and a detector array (28) at the image plane (24). The detector array (28) is a one-dimensional detector array (28) or a two-dimensional detector array (28) comprising a plurality of detector subelements (42), and the detector subelements (42) are sized responsive to the blur diameter.

Claim 17

The steps of method claim 17 are illustrated in Figure 17 and the physical elements are illustrated in Figures 1-3, and discussed at in detail at page 6, line 10-page 14, line 19. The physical elements are illustrated in Figures 1-3, and the concept of blur-circle image is illustrated in Figure 5.

Claim 17 recites a method for locating a position of a feature in a scene, comprising the steps of forming (step 120) an image of the feature using a segmented array having a plurality of array subelements (42), wherein each of the array subelements (42) has an output signal (44), and cooperatively analyzing (step 122) the output signals (44) from at least two spatially adjacent array subelements (42) to establish a data set reflective of an extent to which output signals (44) responsive to the image of the feature are produced from exactly one or from more than one of the adjacent array subelements (42), and to reach a conclusion from the data set as to a location of the image of the feature on the segmented array.

Grounds of rejection to be reviewed on appeal

Ground 1. Claims 17 and 20 are rejected under 35 USC 102 as anticipated by Vock US Patent 6,320,173.

Ground 2. Claims 17-19 are rejected under 35 USC 102 as anticipated by Perregaux US Patent 6,654,056.

Ground 3. Claims 13-15 and 21 are rejected under 35 USC 103 over Hou US Patent 6,596,979 in view of Coufal US Pub. 2003/0053221.

Ground 4. Claims 1-5 and 11-12 are rejected under 35 USC 103 over Carnall US Patent 5,065,245 in view of Hou '979 and further in view of Coufal US Pub. '221.

Argument

Basis of the Invention

In a typical light-imaging sensor system such as that used in missile detection and tracking, a feature in a scene is imaged onto an image surface by optical elements such as lenses and mirrors. A detector segmented array formed of a number of detector subelements is located at the image surface, so that the feature is imaged onto the detector array. The output signals of the detector subelements are amplified and supplied to an image-processing computer, which determines the location and nature of the image of the feature.

The detector array may be a one-dimensional or linear array of detector subelements that is optionally scanned over the scene to produce a two-dimensional image. The detector array may instead be a two-dimensional areal or staring array of detector subelements.

The accuracy of the determination of the location of the feature is a crucial concern in such imaging sensors. In the usual approach, the spatial location of the feature is determined by observing which detector subelement intercepts the image of the feature. However, in both the one-dimensional and two-dimensional detector arrays, there is a natural locational uncertainty of the image within the detector subelement. If the detector subelements are made smaller to reduce this uncertainly, "edge effects" between adjacent detector subelements introduce a locational uncertainty, as the image of the feature may not fall entirely within a single detector subelement, as well as a loss of sensitivity because the signal energy of the feature is split between two or more detector subelements. The accuracy of the location determination is thus limited by the geometry and absolute size of the detector subelements.

The present application provides two different, but related, techniques for determining the location of the image of the feature more precisely.

In one aspect of the present approach, as recited in claims 1-16, the sizes of the detector subelements are selected responsive to the blur diameter. That is, the optimal

sizes of the detector subelements are selected responsive to the characteristics and performance of the optical system, as quantified by the "blur diameter" of the optics system.

Applicant took great care to define, both in the Specification and in the Claims, the "blur circle" and the "blur diameter" as used in the present application, so that there could be no mistake in confusing other optical concepts with the blur circle and the blur diameter. As discussed at page 6, lines 10-23 of the Specification, the "blur diameter" is the diameter of a point in the scene when it is imaged onto the detector. When imaged onto the detector, a point in the scene is no longer a point on the detector because of unavoidable imperfections in the optics system such as aberrations. The blur diameter thus reflects the characteristics of the optics system--its lenses and/or mirrors. Each of the independent claims dealing with this aspect of the invention, claims 1 and 13, also includes the definitional language, "an optics system that images a point feature of a scene at an image plane as a blur-circle image having a blur diameter".

Applicant emphasizes this point--that the "blur diameter" is the diameter of a blurred circle formed by a point in the scene after the image has passed through the optics and has been blurred by unavoidable imperfections in the optics. None of the applied references mention this concept of blur circle or blur diameter in any way. Although the explanations of the rejections argue that such a concept is present in some of the references, they do not point to any location where there is a discussion of the size of the image of a point on the detector after the image has passed through the optics of the system. Absent such a recognition of the significance of the blur circle and blur diameter, there can be no teaching of the next step--sizing the detector subelements responsive to the blur diameter.

The present approach chooses the sizes of the detector subelements in response to the properties of the optics system to obtain an optimal performance of the combination of the optics system and the detector. Such an approach has not been followed previously, and certainly is not disclosed or taught by any of the references, singly or in combination.

In another aspect of the present approach, as recited in claims 17-20, the image on the detector is analyzed as to whether it is produced from exactly one or from more

than one subelement of the detector array. Mathematically, this semi-qualitative information may be used to determine the location of the scene image.

Grounds of Rejection

Ground 1. Claims 17 and 20 are rejected under 35 USC 102 as anticipated by Vock US Patent 6,320,173.

The following principle of law applies to sec. 102 rejections. MPEP 2131 provides: "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. The identical invention must be shown in as complete detail as is contained in the ... claim. The elements must be arranged as required by the claim..." [citations omitted] This is in accord with the decisions of the courts. Anticipation under section 102 requires 'the presence in a single prior art disclosure of all elements of a claimed invention arranged as in that claim.' Carella v. Starlight Archery, 231 USPQ 644, 646 (Fed. Cir., 1986), quoting Panduit Corporation v. Dennison Manufacturing Corp., 227 USPQ 337, 350 (Fed. Cir., 1985)

Thus, identifying a single element of the claim which is not disclosed in the reference is sufficient to overcome a Sec. 102 rejection.

The explanation of the rejection focuses on the embodiments of Figures 6A-6B of Vock. Applicant will direct the remarks primarily to these embodiments as well.

Claim 17

Claim 17 deals with the second aspect of the invention, as discussed above. Claim 17 recites in part:

"cooperatively analyzing the output signals from at least two spatially adjacent array subelements

to establish a data set reflective of an extent to which

> output signals responsive to the image of the feature are produced from exactly one or from more than one of the adjacent array subelements, and
>
> to reach a conclusion from the data set as to a location of the image of the feature on the segmented array."

The explanation of the rejection (Office Action, page 3, lines 1-3) asserts that this limitation is disclosed in Vock at col. 3, lines 13-25 and col. 7, lines 33-40. The language of the rejection, found in the paragraph bridging pages 2-3 of the Office Action, simply copies the language of claim 17, without referencing the language and disclosure actually found in Vock.

At these two locations, Vock discusses the hardware used in his system for tracking golf balls. Vock describes a high-speed camera system and the use of digital electronics, but does not discuss how the digital electronics works. Neither of these sections of Vock discloses any analysis of the information, and there is certainly no disclosure of any cooperative analysis of the output signals. There is no disclosure of data sets, no disclosure of establishing the extent to which output signals responsive to the image of the feature are produced from exactly one or from more than one of the adjacent array subelements, and no disclosure of the use of the data set to reach a conclusion from the data set as to a location of the image of the feature on the segmented array.

<u>Claim 20</u>

Claim 20 incorporates the limitations of claim 17 and is therefore patentable over Vock as well. Additionally, claim 20 recites:

> "providing a two-dimensional segmented array formed of a pattern of square array subelements, wherein four of the square array subelements meet at an intersection point, and wherein the step of forming an image includes the step of
>
> forming the image having a diameter of one blur diameter."

The explanation of the rejection (Office Action, page 3, lines 4-9) does not reference any location in Vock where this limitation is said to be taught, but does mention Figures 6A-6B. The explanation of the rejection references "the slightly blurred image of 142a-e, 152, or 154". This is not a quote, or information drawn, from Vock--it is made up for the purposes of the rejection. There is no disclosure in Vock of blur diameters or one blur diameter, or any concept of blur diameter, which could arguably be said to teach the limitations of claim 20.

As discussed in para. [0034] of the present application, "In all cases, each point in the scene is imaged as a blur spot. The diameter of this spot is referred to as a 'blur diameter', and is a characteristic of the optics system 22." The blur diameter is related to the apparent size on the detector of a point in the scene, and there is no mention of that concept in Vock.

The Examiner is attempting to read something of the present invention into Vock by referring to the concept of blur diameters from the present application, and quoting the language of the present claims and specification. No one reading Vock without knowledge of the present application will find any disclosure of blur diameter in Vock.

The reference to "slightly blurred image" in the explanation of the rejection is evidence of this attempted hindsight reconstruction. Vock itself has no mention of a "slightly blurred image". That concept is imported into the explanation of the rejection entirely from the present invention, to give the false impression that Vock has something to do with a blurred image.

The Response to Arguments at pages 8-10 of the Office Action is inadequate. Despite Applicant's request, it does not point out where the specific concepts recited in the claims are disclosed in Vock. At page 9, 6 lines from the bottom of the page, the Response argues as to what Vock "suggests". A sec. 102 rejection does not involve suggestion. There must be a disclosure of the invention in the level of detail of the claim recitations.

Ground 2. Claims 17-19 are rejected under 35 USC 102 as anticipated by Perregaux US Patent 6,654,056.

Claim 17

Claim 17 recites in part:

> "cooperatively analyzing the output signals from at least two spatially adjacent array subelements
>
> to establish a data set reflective of an extent to which output signals responsive to the image of the feature are produced from exactly one or from more than one of the adjacent array subelements, and
>
> to reach a conclusion from the data set as to a location of the image of the feature on the segmented array."

Perregaux discloses configurations for photosites on chips that reduce Moire patterns. It does not relate to image analysis.

The explanation of the rejection (Office Action, page 3, line 12-page 4, line 3) asserts that it finds this disclosure at col. 14, lines 28-36 of Perregaux. This portion of Perregaux discloses that the electronic subsystem receives image signals "and processes these signals to convert them to a continuous tone or grayscale rendition of the image." The gray-scale signals are provided to a raster output scanner. That disclosure does not even mention the analysis of spatially adjacent array subelements, establishing of a data set, establishing a data set reflective of an extent to which output signals responsive to the image of the feature are produced from exactly one or from more than one of the adjacent array subelements, reaching any type of conclusion, or reaching a conclusion from the data set as to a location of the image of the feature on the segmented array. Perregaux isn't concerned with analyzing the image of features--it is concerned with processing the image to reduce Moire patterns.

Perregaux has no disclosure of the limitations of claim 17.

Claim 18

Claim 18 incorporates the limitations of parent claim 17 and is therefore not disclosed by Perregaux

Claim 19

The explanation of the rejection (Office Action, page 4, lines 4-6) argues that Figure 5 of Perregaux discloses intersecting array subelements. The features shown in Figure 5 of Perregaux, whatever they are, clearly do not intersect--there are spaces between them.

The Response to Arguments at page 10 of the Office Action is inadequate. It does not point out where the specific concepts recited in the claims are disclosed in Perregaux. At page 10, 9 lines from the bottom of the page, the Response argues as to what Perregaux "suggests". A sec. 102 rejection does not involve suggestion. There must be a disclosure of the invention in the level of detail of the claim recitations.

Ground 3. Claims 13-15 and 21 are rejected under 35 USC 103 over Hou US Patent 6,596,979 in view of Coufal US Pub. 2003/0053221.

MPEP 2142, under ESTABLISHING A PRIMA FACIE CASE OF OBVIOUSNESS, provides: "To establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine the reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. [citations omitted]. See MPEP para 2143-2143.03 for decisions pertinent to each of these criteria."

First requirement--there must be an objective
basis for combining the teachings of the references

The first of the requirements of MPEP 2142 is that "there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine the reference teachings". The present rejection is a sec. 103 combination rejection. To reach a proper teaching of an article or process through a combination of references, there must be stated an objective motivation to combine the teachings of the references, not a hindsight rationalization in light of the disclosure of the specification being examined. MPEP 2142, 2143 and 2143.01. See also, for example, In re Fine, 5 USPQ2d 1596, 1598 (at headnote 1) (Fed.Cir. 1988), In re Laskowski, 10 USPQ2d 1397, 1398 (Fed.Cir. 1989), W.L. Gore & Associates v. Garlock, Inc., 220 USPQ 303, 311-313 (Fed. Cir., 1983), and Ex parte Levengood, 28 USPQ2d 1300 (Board of Appeals and Interferences, 1993); Ex parte Chicago Rawhide Manufacturing Co., 223 USPQ 351 (Board of Appeals 1984). As stated in In re Fine at 5 USPQ2d 1598:

> "The PTO has the burden under section 103 to establish a prima facie case of obviousness. [citation omitted] It can satisfy this burden only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references."

And, at 5 USPQ2d 1600:

> "One cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention."

Following this authority, the MPEP states that the examiner must provide such an objective basis for combining the teachings of the applied prior art. In constructing

such rejections, MPEP 2143.01 provides specific instructions as to what must be shown in order to extract specific teachings from the individual references:

> "Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention when there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. In re Fine, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); In re Jones, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992)."
>
> * * * * *
>
> "The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination." In re Mills, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990)."
>
> * * * * *
>
> "A statement that modifications of the prior art to meet the claimed invention would have been 'well within the ordinary skill of the art at the time the claimed invention was made' because the references relied upon teach that all aspects of the claimed invention were individually known in the art is not sufficient to establish a prima facie case of obviousness without some objective reason to combine the teachings of the references. Ex parte Levengood, 28 USPQ2d 1300 (Bd.Pat.App.& Inter. 1993)."

Here, there is set forth no objective basis for combining the teachings of the references in the manner used by this rejection, and selecting the helpful portions from each reference while ignoring the unhelpful portions. An objective basis is one set forth in the art or which can be established by a declaration, not one that can be developed in light of the present disclosure.

There is stated, and can be, no basis for combining the teachings of Hou and

Coufal. Hou and Coufal deal with entirely different things. Hou teaches photodetectors upon which a scene is imaged. In the specific case of most interest to Hou, the scene is a paper-based object, such as text and graphics, that is to be imaged in a flat-bed scanner or the like. (See for example col. 1, lines 22-25 and col. 2, lines 57-59.) Coufal deals with an entirely different subject, the tailoring of the transverse intensity distribution of a beam of light produced by a laser or other collimated light source having a Gaussian transverse intensity distribution. (See, for example, para. [0003]-[0011], [0014]-[0017], and claim 1 of Coufal) There is absolutely no reason to believe that light from a scene, such as imaged by Hou, is in the form of a beam having a Gaussian intensity distribution such as discussed and required by Coufal. It is not in such a form, being ordinary visible light and not a laser beam.

There is no basis for combining the teachings of these two references dealing with entirely different problems, technologies, approaches, and apparatus. The rejections seek to pick and choose useful elements from the two disparate references, and even then are not successful.

Second requirement--there must be
an expectation of success

The <u>second of the requirements of MPEP 2142</u> is an expectation of success. There is no expectation of success. This requirement has not been addressed in the explanation of the rejection, and in any event more than Examiner's argument is required here. Applicant will be interested to see the argument for success in light of the completely different purposes of the technologies of Hou and Coufal.

As stated in MPEP 2142, "The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. [citations omitted]."

Third requirement--the prior art
must teach the claim limitations

The <u>third of the requirements of MPEP 2142</u> is that "the prior art reference (or references when combined) must teach or suggest all the claim limitations." In this regard, the following principle of law applies to all sec. 103 rejections. MPEP 2143.03 provides "To establish <u>prima facie</u> obviousness of a claimed invention, <u>all claim limitations must be taught or suggested by the prior art</u>. <u>In re Royka</u>, 490 F2d 981, 180 USPQ 580 (CCPA 1974). All words in a claim must be considered in judging the patentability of that claim against the prior art. In re Wilson, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970)." [emphasis added] That is, to have any expectation of rejecting the claims over a single reference or a combination of references, each limitation must be taught somewhere in the applied prior art. If limitations are not found in any of the applied prior art, the rejection cannot stand. In this case, the applied prior art references clearly do not arguably teach some limitations of the claims.

The explanation of the rejection (long paragraph bridging pages 4-5 of the Office Action) focuses on the embodiments of Figures 2-3 and Figure 10 of Hou, discussed at col. 9, line 52 et seq. Applicant will direct the remarks primarily to these embodiments as well.

<u>Claims 13-14</u>

Claim 13 recites in part:

> "an optics system that images a point feature of a scene at an image plane as a blur-circle image having a blur diameter"

The explanation of the rejection seeks to analogize the "scanning dot" of Hou with the recited "blur circle". There is no factual basis for that attempted analogy, and nothing in Hou supports the argument of the explanation of the rejection on this point. In fact the "scanning dot" of Hou is not the "blur circle" recited in the present claims.

Hou is concerned with optical flatbed scanners such as used to scan the printed matter of a document for input into a computer (col. 1, lines 14-35). The "scanning dot" of Hou is the light spot that is scanned across the printed matter. The scanning dot is not a "blur circle", which is the image of a point feature of a scene at an image plane (see definition in para. [0034] of the present application).

The explanation of the rejection of claim 13 in the paragraph bridging pages 4-5 of the Office Action has a long discussion of what Hou is said to teach in terms of blur diameters. In the midst of this discussion, at page 6, lines 8-10, the explanation states "Hou does not explicitly disclose that the optics system that images a point feature of a scene at an image plane as a blur-circle image having a blur diameter." The explanation of the rejection thus admits that Hou has nothing to do with the presently claimed invention, which explicitly recites working with a blur diameter. In point of fact, Hou does not explicitly or implicitly disclose or teach anything about blur circles and blur diameters or the concepts underlying blur circles and blur diameters. The discussion at col. 10, lines 12-18 of Hou is not related to blur diameter, but simply a statement of the size of the scanning dot. Hou does not discuss how the image of the scanning dot is altered to a blurred image after it has passed through the optics.

Accordingly, the long discussion prior to this point of the explanation of the rejection is nothing but a paraphrasing of the recitation of claim 13. It is unrelated to anything that is taught by Hou. There is no disclosure in Hou of "an optics system that images a point feature of a scene at an image plane as a blur-circle image having a blur diameter". Hou has no teaching of any of this argued material found at page 4, line 14-page 5, line 2 of the Office Action.

Claim 13 further recites in part:

"...detector subelements are sized responsive to the blur diameter..."

Hou does not disclose or teach a blur diameter, and therefore cannot disclose or teach that the photodetectors are sized in any manner responsive to a blur diameter. The sizing of detector subelements functionally responsive to the blur diameter is a concept originated in the present application.

The explanation of the rejection (Office Action, page 5, lines 3-8) then relies upon Coufal's teachings at para. [0089]. At this location, Coufal teaches that there must be aspherical Gaussian-to-flattop optics followed by a beam expander added to the optical system. Coufal teaches as necessary exactly what the present invention avoids, the addition of an expensive, heavy, and space-consuming optical elements to the optics system. Neither Coufal nor Hou teaches sizing the detector subelements responsive to the blur diameter.

Claim 15

Claim 15 incorporates the limitations of claim 13 and is therefore patentable as discussed above.

Claim 15 recites that the detector subelements are rectangular in plan view. A rectangle is not a square, as used in the present application. As discussed at page 7, lines 20-25 and illustrated in Figure 3 of the Specification, the length L and the width W of the rectangle are not the same. Neither Hou nor Coufal has any such teaching.

Claim 21

Claim 21 incorporates the limitations of claim 13 and is therefore patentable as discussed above.

Claim 21 also recites in part:

> "each detector subelement overlaps each of two adjacent detector subelements along their lengths by an amount that is responsive to the blur diameter".

Although the explanation of the rejection asserts that the amount of overlap in Figure 10 of Hou is responsive to the blur diameter, there is no such teaching in Hou and there is no mention of "blur diameter" in Hou.

The explanation of the rejection and the Response to Argument are founded solely on attempted hindsight application of concepts that the Examiner has learned from the present invention, but are not taught in any way in either reference.

Ground 4. Claims 1-5 and 11-12 are rejected under 35 USC 103 over Carnall US Patent 5,065,245 in view of Hou '979 and further in view of Coufal US Pub. '221.

Applicant incorporates from the discussion of Ground 3 the legal requirements for a sec. 103 rejection.

First requirement--there must be an objective
basis for combining the teachings of the references

The teachings of Hou cannot be combined with those of Carnall due to the different geometries and analytical procedures taught by the two references.

In the sentence bridging pages 6-7 of the Office Action, it is argued that combining the teachings of these two references would provide a "reliable means of focusing and aligning image onto the photodetector array". No location is referenced for this assertion, and Applicant cannot find any such assertion in either reference. Further, there is no reason to believe that Carnall needs such a means, or that the approach of Hou would provide such a feature to Carnall's structure.

Further, there is no basis for adding in the teachings of Coufal. Applicant incorporates the discussion of the different technologies of Hou and Coufal from the Ground 3 discussion. This point applies here as well, and to the attempt to combine teachings of Coufal with those of Carnall. Carnall also deals with a sensor, not the tailoring of the transverse intensity of a Gaussian-distribution laser beam as in Coufal.

Second requirement--there must be
an expectation of success

This requirement is not addressed in the explanation of the rejection. Applicant incorporates its prior discussion of this requirement.

Third requirement--the prior art
must teach the claim limitations

Claim 1

Claim 1 recites in part:

> "an optics system that images a point feature of a scene at an image plane as a blur-circle image having a blur diameter;"

None of the references teach or even mention "blur-circle image" or "blur diameter" or the concept of the blurring of a point of light in the scene after passing through the optics at all, in any way.

At page 6, lines 15-20, the explanation of the rejection states: "Carnall, Jr. does not disclose an optics system that images a point feature of a scene at an image plane as a blur-circle image having a blur diameter. Hou shows in Fig. 2B a) an optics system (208, optical lens 274) that images a point feature of a scene at an image plane as a blur-circle image having a blur diameter (col. 5, lines 27-33)." Hou has no such disclosure or teaching at col. 5, lines 27-33 or elsewhere. This is purely a hindsight reconstruction of the present invention in an attempt to discredit it. There is no mention or teaching of blur circle image or any analogous concept in Hou or Carnall.

Claim 1 further recites in part:

> "the detector array is a one-dimensional detector array comprising a plurality of detector subelements each having a width of from about 1/2 to about 5 blur diameters, and a length of n blur diameters,"

None of the references teach these numerical limitations. The explanation of the rejection asserts that Carnall teaches these limitations by paraphrasing the present

disclosure and claims, but points to no location in the reference as a source of the teachings.

These are very specific numerical limitations. To support the rejection, they must be found in the teachings of at least one of the references, but they are not.

Claim 1 further recites in part:

> "wherein an overlap of each of the two adjacent detector subelements is m blur diameters and a center-to-center spacing of each of the two adjacent detector subelements is n_0 blur diameters, and
> wherein n is equal to about 3m and m is equal to about $n_0/2$."

Neither reference teaches these limitations. The explanation of the rejection asserts that Carnall teaches these limitations, but points to no location in the reference as a source of the teachings. Again, these are specific numerical limitations that are not taught by any of the references.

In the first full paragraph on page 7 of the Office Action, its the same thing. The rejection is nothing but quotations from the present claims instead of a discussion of what Carnall teaches, without referencing any sources in Carnall. The only citation is to col. 5, lines 27-33 of Hou, which teaches the general operation of photodetectors, and has nothing to do with blur circles or blur diameters. None of the references teach the numerical limitations of claims 1-5.

<u>Claim 2</u>

Claim 2 depends from claim 1 and incorporates its limitations. The limitations of claim 1 are not taught by the references for the reasons stated above and which are incorporated here. Claim 1 is not taught by the combination of references, and claim 2 therefore also cannot be taught by the combination of references.

Claim 2 further recites in part:

> "the detector subelements each have a width of about 1 blur diameter."

There is no teaching in either reference of this limitation. As pointed out above, the attempt to analogize the "scanning spot" of Hou with the "blur circle" of the present claims is baseless and is not supported by anything in Hou. In fact, Hou's discussion of its application in flatbed scanners makes it clear that Hou is talking about a scanning spot that travels over the document, not the broadening of a point in the scene by the optics of the imaging system, the underlying concept of blur circle.

But even if such an analogy were made, none of the references has any teaching of the quoted numerical claim limitation.

In the explanation of the rejection (first full paragraph on page 7 of the Office Action), it is argued "subelements each have a width of about 1 blur diameter", referencing Figure 1 of Carnall. Figure 1 is a side view of a sensor array apparatus, and no feature that could arguably be indicated as a "blur diameter" is even shown. Carnall also has no teaching of such a limitation in its specification text.

Claim 3

Claim 3 depends from claim 1 and incorporates its limitations. The limitations of claim 1 are not taught by the references for the reasons stated above and which are incorporated here. Claim 1 is not taught by the combination of references, and claim 3 therefore also cannot be taught by the combination of references.

Claim 3 further recites in part:

> "n lies in a range of from about (3m-2) to about (3m+2), and m lies in a range of from about (n_0/2-1) to about (n_0/2+1)."

There is no teaching in either reference of this numerical limitation. As pointed out above, the attempt to analogize the "scanning spot" of Hou with the "blur circle" of the present claims is baseless and is not supported by anything in Hou. In fact, Hou's discussion of its application in flatbed scanners makes it clear that Hou is discussing a scanning spot that travels over the document, not the broadening of a

point in the scene by the optics of the imaging system.

But even if such an analogy were made, none of the references has any teaching of the quoted numerical claim limitations.

In the explanation of the rejection (first full paragraph on page 7 of the Office Action), it is argued "n lies in a range of from about (3m - 2) to about (3m + 2), and m lies in a range of from about ($n_o/2$ - 1) to from ($n_o/2$ + 1)", referencing Figure 1 of Carnall. Figure 1 is a side view of a sensor array, and no feature that could arguably be indicated as a "blur diameter" is even shown. Carnall also has no teaching of such a limitation in its specification text.

Claim 4

Claim 4 depends from claim 1 and incorporates its limitations. The limitations of claim 1 are not taught by the references for the reasons stated above and which are incorporated here. Claim 1 is not taught by the combination of references, and claim 4 therefore also cannot be taught by the combination of references.

Claim 4 further recites in part:

> "n lies in a range from (3m-2) to (3m+2), and m lies in a range of from ($n_O/2$-1) to ($n_O/2$+1)."

There is no teaching in either reference of this numerical limitation. As pointed out above, the attempt to analogize the "scanning spot" of Hou with the "blur circle" of the present claims is baseless and is not supported by anything in Hou. In fact, Hou's discussion of its application in flatbed scanners makes it clear that Hou is talking about a scanning spot that travels over the document, not the broadening of a point in the scene by the optics of the imaging system.

But even if such an analogy were made, none of the references has any teaching of the quoted claim limitations.

In the explanation of the rejection (first full paragraph on page 7 of the Office Action), it is argued "n lies in a range of from (3m - 2) to (3m + 2), and m lies in

a range of from $(n_0/2 - 1)$ to $(n_0/2 + 1)$", referencing Figure 1 of Carnall. Figure 1 is a side view of a sensor array, and no feature that could arguably be indicated as a "blur diameter" is even shown. Carnall also has no teaching of such a limitation in its specification text.

<u>Claim 5</u>

Claim 5 depends from claim 1 and incorporates its limitations. The limitations of claim 1 are not taught by the references for the reasons stated above and which are incorporated here. Claim 1 is not taught by the combination of references, and claim 5 therefore also cannot be taught by the combination of references.

Claim 5 further recites in part:

"n is equal to 3m and m is equal to $n_0/2$."

There is no teaching in either reference of this numerical limitation. As pointed out above, the attempt to analogize the "scanning spot" of Hou with the "blur circle" of the present claims is baseless and is not supported by anything in Hou. In fact, Hou's discussion of its application in flatbed scanners makes it clear that Hou is talking about a scanning spot that travels over the document, not the broadening of a point in the scene by the optics of the imaging system.

But even if such an analogy were made, none of the references has any teaching of the quoted claim limitation.

In the explanation of the rejection (first full paragraph on page 7 of the Office Action), it is argued "n is equal to 3m and m is equal to $n_0/2$", referencing Figure 1 of Carnall. Figure 1 is a side view of a sensor array, and no feature that could arguably be indicated as a "blur diameter" is even shown. Carnall also has no teaching of such a limitation in its specification text.

<u>Claim 11</u>

Claim 11 incorporates the limitations of claim 1, which are not taught by the

combination of references for the reasons stated above. Claim 11 is therefore also patentable over this ground of rejection.

Claim 12

Claim 12 incorporates the limitations of claim 1, which are not taught by the combination of references for the reasons stated above. Claim 12 is therefore also patentable over this ground of rejection.

The Response to Arguments at pages 11-12 is inadequate. It does not point out where the specific concepts recited in the claims are taught in the references.

In response to Applicant demonstrating that there is no basis for combining the teachings of the references, the Examiner responds, "In this case, the motivation for combining the references suggested above has been filed in the acknowledged motivation generally available to the examiner as one of ordinary skill in the art." Applicant notes that this arrangement of words is unintelligible, but it appears that the Examiner is claiming to be a person of ordinary skill in the art. Applicant asks that, if this position is maintained, the Examiner make his resume of record so that it may be determined objectively by the Board whether he is a person of ordinary skill in the art. The Examiner has not set forth any objective basis for combining the teachings of the references, or for an expectation of success.

Summary and Conclusion

Regarding claims 1-5, 11-12, 13-15, and 21, there is nothing in any of the references dealing with the concept of the size of the image of a point of a scene after it has passed through imperfect optics. Nor is there any mention of selecting the size of detector subelements responsive to the blur diameter.

The explanations of the rejections make unfounded statements that help the reader to understand that the rejections are based upon paraphrasing the present claim limitations in hindsight, not finding the limitations taught in the art. At page 7, lines 3-8 of the Office Action, asserted numerical teachings of Carnall are set forth, with no

citations to any location in Carnall where the asserted teachings are found. These asserted numerical teachings are, remarkably, exactly those recited in the present claims. Carnall plainly has no such teachings, and it is equally clear that the other references applied in the rejections do not teach the subject matter asserted in the explanations of the rejections.

Regarding claims 17-20, there is nothing in any of the references disclosing or teaching establishing a data set reflective of an extent to which output signals responsive to the image of the feature are produced from exactly one or from more than one of the adjacent array subelements, and then reaching a conclusion from the data set as to a location of the image of the feature on the segmented array.

Respectfully submitted,

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APPENDIX I

Copy of Claims Involved in the Appeal

1. An imaging sensor system comprising

an optics system that images a point feature of a scene at an image plane as a blur-circle image having a blur diameter; and

a detector array at the image plane,

wherein the detector array is a one-dimensional detector array comprising a plurality of detector subelements each having a width of from about 1/2 to about 5 blur diameters, and a length of n blur diameters,

wherein each detector subelement overlaps each of two adjacent detector subelements along their lengths,

wherein an overlap of each of the two adjacent detector subelements is m blur diameters and a center-to-center spacing of each of the two adjacent detector subelements is n_O blur diameters, and

wherein n is equal to about 3m and m is equal to about $n_O/2$.

2. The imaging sensor system of claim 1, wherein the detector subelements each have a width of about 1 blur diameter.

3. The imaging sensor system of claim 1, wherein n lies in a range of from about (3m-2) to about (3m+2), and m lies in a range of from about ($n_O/2-1$) to about ($n_O/2+1$).

4. The imaging sensor system of claim 1, wherein n lies in a range from (3m-2) to (3m+2), and m lies in a range of from ($n_O/2-1$) to ($n_O/2+1$).

5. The imaging sensor system of claim 1, wherein n is equal to 3m and m is equal to $n_O/2$.

11. The imaging sensor system of claim 1, further including

a scanning mechanism that scans the one-dimensional detector array in a scanning direction perpendicular to the length of the detector subelements.

12. The imaging sensor system of claim 1, further including

a moving platform upon which the one-dimensional detector array is mounted.

13. An imaging sensor system comprising

an optics system that images a point feature of a scene at an image plane as a blur-circle image having a blur diameter; and

a detector array at the image plane,

wherein the detector array is a one-dimensional detector array or a two-dimensional detector array comprising a plurality of detector subelements, and

wherein the detector subelements are sized responsive to the blur diameter.

14. The imaging sensor system of claim 13, wherein the detector subelements are square in plan view.

15. The imaging sensor system of claim 13, wherein the detector subelements are rectangular in plan view.

17. A method for locating a position of a feature in a scene, comprising the steps of

forming an image of the feature using a segmented array having a plurality of array subelements, wherein each of the array subelements has an output signal; and

cooperatively analyzing the output signals from at least two spatially adjacent array subelements

to establish a data set reflective of an extent to which output signals responsive to the image of the feature are produced from exactly one or from more than one of the adjacent array subelements, and

to reach a conclusion from the data set as to a location of the image of the feature on the segmented array.

18. The method of claim 17, wherein the step of providing a sensor includes the step of

providing a one-dimensional segmented array having spatially overlapping array subelements.

19. The method of claim 17, wherein the step of providing a sensor includes the step of

providing a two-dimensional segmented array formed of a pattern of intersecting array subelements.

20. The method of claim 17, wherein the step of providing a sensor includes the step of

providing a two-dimensional segmented array formed of a pattern of square array subelements, wherein four of the square array subelements meet at an intersection point, and wherein the step of forming an image includes the step of

forming the image having a diameter of one blur diameter.

21. The imaging sensor system of claim 13, wherein each detector subelement overlaps each of two adjacent detector subelements along their lengths by an amount that is responsive to the blur diameter.

APPENDIX II

Evidence Entered and Relied Upon in the Appeal

None

APPENDIX III

Related Proceedings

None

APPENDIX IV

Claims Not Properly Rejected

6. The imaging sensor system of claim 1, wherein the length of the detector subelements is at least 20 times the detector width, and wherein n is substantially equal to 3m and m is substantially equal to $n_O/2$.

7. The imaging sensor system of claim 1, wherein n is substantially equal to (3m-2) and m is substantially equal to ($n_O/2$-1).

8. The imaging sensor system of claim 1, wherein the length of the detector subelements is less than 20 times the detector width, and wherein n is substantially equal to (3m-2) and m is substantially equal to ($n_O/2$-1).

9. The imaging sensor system of claim 1, wherein n is substantially equal to (3m+2) and m is substantially equal to ($n_O/2$+1).

10. The imaging sensor system of claim 1, wherein the length of the detector subelements is less than 20 times the detector width, and wherein n is substantially equal to (3m+2) and m is substantially equal to ($n_O/2$+1).

16. The imaging sensor system of claim 15, wherein the detector array is a two-dimensional detector array, and wherein each detector subelement is rectangular in plan view with a length of n blur diameters, a lengthwise overlap of 1 blur diameter relative to a laterally adjacent detector subelement, and a staggered pattern of detector subelements that repeats every m laterally adjacent rows, where m is a positive integer.